

A community-based investigation of the avoidable factors of maternal mortality in Nigeria: the pilot experience

Adetoro A. Adegoke¹, Taiwo O. Lawoyin², Martins O. Ogundeji³, Ann M. Thomson¹

¹ School of Nursing Midwifery and Social Work, University of Manchester

² Department of Community Medicine, Faculty of Public Health, University of Ibadan

³ Primary Health Care and Health Management Centre, Ibadan Nigeria

Abstract

Background: Reduction of maternal mortality is one of the major goals of several recent international conferences and has been included within the Millennium Development Goals. However, because measuring maternal mortality is difficult and complex, reliable estimates of the dimensions of the problem are not generally available and assessing progress towards the goal is difficult in some countries. Reliable baseline data are crucial to effectively track progress and measure that targets or goals of reducing maternal mortality have been met.

Objectives: The objectives of this pilot study were: to test adequacy of research instruments; to improve research techniques; to determine an appropriate workload; to determine the time required for interviews; and to assess the feasibility of a (full-scale) study/survey.

Methods: This pilot study was conducted between 11th April and 22nd April 2005. 420 houses were visited and interviews of 420 respondents between the ages of 15-49 were conducted in a randomly pre-selected Local Government Area of Oyo state using a structured instrument developed using the principles of the Sisterhood Method.

Results: There was willingness of the public to participate in the study. The response rate was 100%. There was no issue raised as regards the structure, wording and translation of the questionnaire. This pilot study uncovered local political problems and other issues that may be encountered during the main study.

Conclusions: The pilot raised a number of fundamental issues related to the process of designing the research instrument, identifying and recruiting Data Collectors, training and supervision of Data Collectors and the research project, gaining access to respondents and obtaining support and approval from "gatekeepers". This paper highlights the lessons learned and reports practical issues that occurred during pilot study.

African Health Sciences 2007; 7(3): 176-181

Introduction

The estimated number of maternal deaths for the world in 2000 was 529,000¹. These deaths were almost equally divided between Africa (251,000) and Asia (253,000), with about 4% (22,000) occurring in Latin America and the Caribbean and less than 1% (2,500) in the more developed regions of the world. In terms of the maternal mortality ratio (MMR), the world figure is estimated to be 400 per 100,000 live births. By region, the MMR was highest in Africa (830), followed by Asia (330), Oceania (240), Latin America and the Caribbean (190), and the developed countries (20)¹.

Most developing countries have no national statistics regarding maternal mortality^{1,2,3,4} and the only

available numbers are the result of research in limited areas in which statistics are compiled from hospital records such as: Ogunniyi and Faleyimu⁵, Okaro, Umezulike, Onah, Chukwuali, Ezugwu, and Nweke⁶ and Etuk, Itam, and Asuquo⁷. Most births in the developing world do not take place in hospitals; therefore, the reported statistics do not accurately reflect the numbers of deaths during pregnancy and childbirth⁸⁻⁹.

In Nigeria, maternal death rates are one indicator used for measuring standards of public health. Nigeria ranked second globally as the country with the highest estimated number of maternal deaths with 37,000 cases of maternal deaths¹. India occupied the first place with 136,000 maternal deaths and Pakistan was in the third place with 26,000 deaths¹. Zonal differences also occur in Maternal Mortality in Nigeria. The 1999 multiple indicator cluster Surveys (MICS)¹⁰ revealed that there were huge urban/rural and zonal disparities in the MMR. For example, maternal mortality was more than twice as high in the rural areas (828 per 100,000 live births) than in the urban areas (351 per 100,000 live

Correspondence author:

Adetoro A. Adegoke

School of Nursing Midwifery and Social Works,

University of Manchester, Oxford Road, Manchester M13 9PL,

E-mail address: ttadegoke@yahoo.com

Tel: 00447939605206, 044161823753

births). The North East was the Zone with the highest MMR (1,549 per 100,000 live births), which is almost ten times higher than in the South West. The rate in the North West (1,025 per 100,000 live births) was six times higher than in the South West ¹⁰.

The effort to lower this maternal death rate has become a high government priority ¹¹. This informed the launching of the National Programme for the Prevention of Maternal Mortality (NPPMM). The aim of this programme is to expand and strengthen advocacy projects for safe motherhood, ignoring the lack of both baseline estimates and of sources and methods for tracking change ⁴. The Federal Ministry of Health, Nigeria also set reproductive health targets for 2006. These include reducing maternal mortality and morbidity by 50%, neonatal morbidity by 30%, unwanted pregnancies by 50%, and sexually transmitted infections by 50% ¹². Setting targets without baseline evidence is likely to end in non achievement of goals. This is because evidence-based decision making clearly requires quality evidence, without which there is a real risk that resources will be wasted and that this waste will go undetected ⁴.

Therefore, in order for maternal health programmes to remain focused, and to make a quantitative evaluation of programme results, maternal mortality statistics must be available at local and national levels ³.

Although maternal mortality statistics can be obtained from three sources: vital registration, hospital service statistics, and community-based surveys ¹³, the majority of developing countries, including Nigeria, do not yet have an adequate system for recording such vital events as maternal deaths. As noted, hospital statistics do not reflect mortality rates accurately as they may suffer serious biases owing to selectivity and may lead to over or under estimate of the level of maternal mortality in the community ^{4,14}. The only feasible method therefore is a community-based survey ⁸.

The sisterhood method is an indirect technique for deriving population-based estimates of maternal mortality ¹³. It is often recommended by the WHO and UNICEF especially for countries with inadequate registration systems and low income resources ¹.

The rationale for the sisterhood method is similar to that of the "sibling-survivorship" method ^{15,16,17}. The sibling-survivorship method starts from the proportion of brothers or sisters already dead among survivors currently age x to estimate the probability of dying between birth and age x. For maternal mortality, the problem is further complicated by the necessity of the respondent's knowing the cause of death, by all maternal deaths having had to occur between ages [Alpha] and

[Beta] (the minimum and maximum ages of childbearing), and by the most widely used index - the Maternal Mortality Ratio (MMR) - having a fertility component (the ratio is defined as the number of maternal deaths per 100,000 live births) ².

The sisterhood method is based on answers to four questions:

- How many sisters have you ever had who ever married (or who survived until age [Alpha])? Of those;
- How many are dead?
- How many are alive?
- How many died while they were pregnant, during delivery, or within six weeks after delivery (that is, died of maternal causes)?

The sisterhood method of indirectly estimating the MMR was developed because of the difficulty and expense in getting such data in other ways, the relative ease of data collection, the relatively small sample size needed, and the relative ease of calculation ¹³. The method has been widely adopted and adapted and has become an important tool in developing countries ¹⁸. This paper, presents the pilot experience of the use of the sisterhood method to estimate maternal mortality in an area of Oyo state, Nigeria.

Objectives of the pilot study

- To test adequacy of research instruments
- To improve research techniques;
- To determine an appropriate workload;
- To determine the time required for interviews;
- To assess the feasibility of a (full-scale) study/survey;
- To assess the willingness of people to take part in a study; and
- To report on other substantive findings arising in the pilot

Methods

Study design

The research design for this pilot study was the multi stage sampling with stratification and clustering.

A multi stage sampling is an extension of cluster sampling where a hierarchy of clusters are chosen going from larger to smaller ¹⁹. Clustering was very useful for this study since it avoids having to compile exhaustive lists of every single person in the population. Clusters should be as heterogeneous as possible within and as homogenous as possible between.

Stratification on the other hand is the process by which the population is divided into subgroups ¹⁹.

Sampling is then conducted separately within each subgroup. Strata should be as homogenous as possible within and as heterogeneous as possible between. This means that strata should be formulated in such a way that individuals belonging to a stratum should be as similar to each other, with respect to key variables, as possible from individuals belonging to a different stratum. Stratification was important in this study because of the existing geographical structure of the state.

Multi stage sampling in this study involves four stages: Stage one- Ibadan city has been purposively selected in Oyo state;

Stage two: a sampling frame of all the Local Government Areas (LGA) in Oyo state was drawn. A LGA was obtained by using simple random sampling (balloting). Ibadan North East LGA was selected.

Stage three: a sampling frame of all the communities in Ibadan North east LGA was drawn. Three communities were randomly selected by simple random sampling (balloting). The communities selected were Okeadu, Idiape and Iwo Road.

Stage four: using the PHC house numbering, the systematic sampling technique was employed to select the houses that were visited in the chosen communities; 46 from Oke adu, 231 from Idiape and 143 from Iwo Road. One household in each of the selected houses was recruited into the study. A house may consist of a one-person household, a multi-person household, or several households. Two or more households may share one house. Regardless of whether they are one-person or multi-person households, the house has one number. For the purpose of this survey, any person male or female 15-49 years of age who lives in one house was included.

Study setting

The setting for the pilot study was the Ibadan North east Local Government Area of Oyo state. Ibadan, the largest indigenous city in tropical Africa, is the capital of Oyo state, which is one of the 36 states of the Federal Republic of Nigeria (excluding the Federal Capital territory, Abuja). It is centrally situated in the South-western sector of the country, and is 145km north-east of Lagos and 372km south-west Abuja. For administrative purposes, the city is made up of 11 Local Government Areas (five in the inner urban area, and six in the outer rural area). The last National census of Nigeria was conducted in 2005. The preliminary results of this census are expected to be produced towards the end of 2006²⁰. Prior to this a national census was undertaken in 1991²¹. Using a growth rate of 2.83% per annum, the National Popu-

lation Commission of Nigeria estimated the population of Ibadan city for the year 2003 as 3,254,700²². The Ibadan North East Local Government with Headquarters in Iwo Road has a population of about 275,629, a projected population of 367,944²² and 76,655 households²³.

This pilot study was conducted between 11th April and 22nd April 2005. 420 houses were visited and interviews of 420 respondents between the ages of 15-49 were conducted in a randomly pre-selected Local Government Area of Oyo state not included in the main study.

The research instrument

A structured instrument was developed in the form of a questionnaire. This questionnaire contained questions on respondents' demographics, socio-demographic information, the questionnaire also contained the four basic questions of Indirect sisterhood Method developed by Graham et al¹³.

The questionnaire was written in English, and translated into Yoruba, the language of the ethnic group. Back translation into English was done according to guidelines to assess the questionnaire for accuracy of translation.

Recruitment and training of data collectors, team leaders and research supervisors

Ten newly qualified midwives and ten experienced Field data collectors were recruited to serve as data collectors in this study. The initial plan was to recruit student midwives as data collectors. It was thought that recruiting student midwives would be advantageous to this study as they are training to be the health professional group primarily concerned with the care of women during pregnancy and childbirth, so as to have "real life" experience of the incidence of maternal mortality. Other data collectors were recruited because not enough student midwives were available. However, the response rate for this study was 100%. The two Supervisors recruited were experienced field supervisors working at the Faculty of Public Health of the College of Medicine, University of Ibadan.

Training

Four-day training was planned consisting of two days classroom teaching, one day practice and role play to review the questionnaire in the class and one day practice in the field. During training it was realised that a day would not be enough for practice in the classroom to ensure that a reasonable level of competence had been attained by data collectors, hence two days were used for practice

in the classroom. The training therefore was for five-days consisting of: two days classroom teaching on specific issues, such as general overview of maternal mortality and the sensitivity of obtaining data on the subject at the community level; two days practice and role play on the review of the questionnaire in the classroom; and a one day practice in the field, to ensure “hands on” experience on the use of the questionnaire. At the end of this day the field practice was followed up with classroom debriefing of the students’ experiences and difficulties. The build-up of classroom teaching, supervisor/investigator’s field teaching and practice interviews in the field, followed by general discussion, was crucial to the motivation of the Data Collectors and the success of the study ²⁴.

The purpose of the training was to orient Data Collectors and Supervisors to the problems of maternal mortality; to specify the survey objectives; the importance of the data to be collected; the importance of the Data Collectors and Supervisors; the appropriate interviewing techniques; to ensure a full understanding of every item of the questionnaire; and to ensure adequate data capture.

A training manual (manual available on request) was prepared for the field staff, containing the questionnaire together with the instruction on the method of completion. It comprised four chapters:

- Overview of maternal mortality;
- Aims and coverage of the survey;
- Data collectors, Team Leaders and Supervisors Tasks; and
- Instruction on the completion of questionnaire

The manual was prepared in English and its aim was to serve as a reference guide for Data Collectors and Supervisors in the field. In-depth instruction was given on the sequence of collecting data using the sisterhood approach and special attention was paid to the word “sister” during teaching as this word could mean nieces, cousins and aunts in the Nigerian context but with the Sisterhood Method it only includes and is strictly limited to sisters born of the same mother.

Research supervision

Overall monitoring of the research was undertaken by the researcher (AA). This provided opportunity for on-the-spot discussion with supervisors and interviewers of problems encountered in the field, clarification of questions with regard to the questionnaire, assessing questionnaires for completeness and distribution of supplies.

On a daily basis, completed questionnaires were collected and edited by the researcher (AA). From this

editing questions that were not clearly understood were identified and further instruction was provided as necessary.

The research Supervisors were responsible for allocating daily work to Data Collectors, checking and registering forms, collecting and correcting missing and conflicting data and ensuring that Data Collectors developed adequate rapport with respondents. In addition, each Supervisor conducted a 5.0 percent validity check of houses/respondents and their questionnaires in the Local Government Area. These houses were randomly selected by the Researcher without the knowledge of Data Collectors. The purpose of the validity check was to monitor the reliability and consistency of the Data collectors.

Pilot study procedures to improve the internal validity of the questionnaire

The questionnaire was administered to pilot subjects in exactly the same way as it was to be administered in the main study

In each selected house, the identity of the Data Collector, and the reason for the visit were made clear. Verbal informed consent was sought and the respondent was informed that he/she had the freedom not to participate in the study or not to continue answering the question at any stage of the interview.

Data Collectors asked subjects for feedback to identify ambiguities and difficult questions

As the Data Collectors interviewed respondents, respondents were asked if each question was clear. The Respondents were asked in particular if the framing and wording of the translation into Yoruba language were adequate and if not they were asked for suggestions in order to make each question culturally acceptable. No correction was raised as regards the wording, structure and translation of the questionnaire. Only one respondent raised the issue that Data Collectors should show more sympathy as the subject is referring to someone very close, a “dead sister”. This was noted, reported and further discussed in the classroom. Data Collectors were also asked to take their time in filling the questionnaire and not “rush through”. The aim was to collect all information and not on the overall number of the questionnaires that Data Collectors could complete per day. Indirect questioning, sometimes in different ways was also used to elicit appropriate answers. The time taken to complete each questionnaire was an average of 60 minutes, including the time for Interviewer’s introduction. Considering the sensitivity of the research and the fact that there were 30 items in the questionnaire it was decided that the time was reasonable.

Efforts were made to check that all questions were answered: Modalities were put in place to establish that replies could be interpreted in terms of the information that is required, as well as to check that all questions were answered.

Determining appropriate workload: More was learned about the environment and feasibility of the survey because it gets very hot and sunny unusually early in the day and hampered progress, and they could be expected to also affect the main study. It was also realised that due to these adverse weather conditions and the need for data collectors to be more sensitive, which made the completion of the questionnaire to take an average of 60 minutes, each data collector could conveniently complete two-three questionnaire a day.

Results and Lessons Learnt from Pilot Study

Willingness to participate in the study

The pilot was supported by the Director of Primary Health Care and the Measurement and Evaluation unit of the LGA. Approval for the study was sought from the Oyo state Ministry of Health Ethical Committee and the Chairman of the Ibadan North East LGA. The study was also approved by the University of Manchester Research and Ethics Committee.

The cooperation of the public was excellent and participants were willing to participate in the study. The response rate for the study was 100%.

Uncovering of Local Political problem and other issues

This pilot study also uncovered local political problems and other issues that may be encountered during the main study. Before the commencement of the pilot study, the Researcher had visited the Monitoring and Evaluation Unit of the LGA, going through the records, there was no incidence of maternal mortality in the political wards selected for the pilot. The Researcher also visited Government Health Centres in the Locality and just like the Headquarters there was no incidence of maternal mortality in the area. Astonishingly, on the first day of the pilot, five cases of maternal deaths were identified in two streets of the political ward. One of the deaths had just occurred a few days before the data collection and the respondent stated that the death occurred in the Health Centre. The Researcher made a return visit to the Health Centre since there was no record of any death in the Health Centre. It was then discovered that the deceased, had actually been admitted in labour to the centre. When her labour was unduly prolonged, the Midwife referred her to Adeoyo Maternity Hospital (a secondary Health care facility). Whilst the family were transporting this woman to the hospital they met a family friend who encouraged them to visit a Herbalist who had helped the friend when she had similar experience in labour. The husband then took his wife there. By the time the family realised that the Herbalist could not help, this

woman was already in a critical condition. Knowing that the Hospital was a long distance away, the family decided to bring the woman back to the Health Centre. The Midwife refused to readmit her because, according to the Midwife, this woman had been referred. This woman eventually died in the car. The Health Centre did not record this death because she did not die in the Health Centre, but outside.

This case was reported to the Director of Primary Health Care to prevent this happening in the future.

Implications of the pilot for main study

The pilot study had the following implications on the main study:

- Probably due to the extensive time used for the classroom training, role play, review of questionnaire and practice on the field as well as the constant supervision of the data collectors, no mistakes were made in the completion of the questionnaire
- Respondents were asked if the questions and translations were well worded and to state any question that appeared confusing or ambiguous. Throughout the pilot study no observations or correction was made as regards the wording or translation of the questionnaire as a result, it was not necessary to make any changes to the layout, wording or translation of the questionnaire;
- The study was also well received and all respondents were willing to participate in the study (100% response rate)
- More was learned about the environment and feasibility of the survey because it gets very hot and sunny unusually early and hampered progress, and they could be expected to affect also the main study;
- Some respondents commented that the study was on a sensitive issue (the death of a sister) and that data collectors should be more tolerant and patient and not rush through the interview;
- During practice debriefing it was emphasised to data collectors that tolerance and patience were key points to ensure the success of the survey; and
- In spite of these adverse weather conditions and the need for data collectors to be more sensitive, it was discovered that it takes an average of 60 minutes to complete a questionnaire and that each data collector can conveniently complete two-three questionnaire a day

Conclusions

It has been said that pilot studies are likely to be “under discussed, underused and underreported”²⁵, that full reports of pilot studies are rare in the research literature^{26, 27} and that when reported, they often only justify the research methods or particular research tool used²⁸.

It is with this in mind that this pilot experience is published with the intention that it might be useful to others

embarking on projects using similar methods. Too often research papers only refer to one element of the pilot study, for example, to the 'pre-testing' or 'pilot testing' of a questionnaire²⁹. When pilot studies are mentioned in more detail in academic papers and reports, researchers regularly comment that they "had learned from the pilot study" and made the necessary changes, without offering the reader details about what exactly was done and learnt²⁸. This is particularly important because pilot studies can be "time-consuming, frustrating, and fraught with unanticipated problems, but it is better to deal with them before investing a great deal of time, money, and effort in the full study"³⁰. It has been explained as well as argued that researchers have an ethical obligation to make the best use of their research experience by reporting issues arising from all parts of a study, including the pilot phase²⁷. Well-designed and well-conducted pilot studies can therefore inform us about the best research process, likely issues and problems that might be encountered and occasionally about likely outcomes.

Reference

1. World Health Organisation. Maternal mortality in 2000: Estimates developed by WHO, UNICEF and UNFPA. www.who.int 2000.
2. Morah, B. C. Registered Births and Deaths in Nigeria. Annual Conference of the Population Association of Nigeria, Benin City, Nigeria. 1980.
3. Graham W.J. and Campbell O.M.R. The measurement Trap. *Journal of Social Science and Medicine*. 1992; 35:967-976
4. Graham W.J. Now or Never: the case of measuring maternal mortality. *The Lancet*. 2002; 359:701-704
5. Ogunniyi, S. O., and Faleyimu, B. L. "Trends in maternal deaths in Ilesa, Nigeria, 1977-1988." *West African Journal of Medicine* 1991; 10(1): 400-404.
6. Okaro, J. M., Umezulike, A. C., Onah, H. E., Chukwuali, L. I., Ezugwu, O. F., and Nweke, P. C.. "Maternal mortality at the University of Nigeria Teaching Hospital, Enugu, before and after Kenya." *African Journal of Reproductive Health* 2001; 5(2): 90-97.
7. Etuk, S. J., Itam, I. H. and Asuquo, E. E. J. "Morbidity and mortality in booked women who deliver outside orthodox health facilities in Calabar, Nigeria." *Acta Tropica* 2000; 75(3): 309-313.
8. Wirawan, D. N., and Linnan, M. "The Bali indirect maternal mortality study." *Studies in Family Planning* 1994; 25(6): 304.
9. World Bank. Country Profile: Nigeria. www.worldbank.org 2003.
10. National-Population-Commission. "Nigeria Demographic and Health Survey 1999". Calverton, Maryland, National Population Commission and ORC/Macro. 2000
11. Okonkwo A.T. Nigeria Government tackles maternal mortality. *The Lancet* 2002; 360:65
12. Roberts, H. "Reproductive health struggles in Nigeria: Can Nigeria's government meet the challenges of maternal mortality and family planning?" *The Lancet* 2003; 361:9373.
13. Graham, W., William B., and Robert W. S. "Estimating Maternal Mortality: The Sisterhood Method" *Studies in Family Planning* 1989; 20 (3):125-135.
14. Adamu, Y. M., Salihu, H. M., Sathiakumarc, N. and Alexander, G. R. "Maternal mortality in Northern Nigeria: a population-based study." *European Journal of Obstetric and Gynaecology and Reproductive Biology* 2003; 109(2): 153-159.
15. Hill K, Trussell J. Further developments in indirect mortality estimation. *Population Studies* 1977; 31:313-34.
16. Timaeus I. An assessment of methods for estimating adult mortality from two sets of data on maternal orphanhood. *Demography* 1986; 23:435-50.
17. Timaeus I. Estimation of adult mortality from orphan hood before and since marriage. *Population Studies* 1991; 45:455-72.
18. World Health Organisation. Revised estimates of maternal mortality. Geneva. 1996
19. World Health Organization. Maternal mortality in 2000: estimates developed by WHO, UNICEF, UNFPA, World Health Organization, Geneva (2004).
20. National Population Commission of Nigeria. 2005 Population and Housing Census Strategy and Implementation Plan. NPC Abuja, Nigeria. www.population.gov.ng Accessed on 8th June 2006
21. National Population Commission. Population Census of the Federal Republic of Nigeria. Abuja. 1991
22. National Population Commission (NPC) [Nigeria] and ORC Macro Nigeria Demographic and Health Survey 2003. Calverton, Maryland. 2004; 3
23. Oyo State Secretariat. Oyo state voters register 2003
24. Kwast, B. E., Roger, W.R., and Widad, K-M. "Maternal Mortality in Addis Ababa, Ethiopia." *Studies in Family Planning* 1986; 17(6): 288-301.
25. Prescott, P.A. and Soeken, K.L. The potential uses of pilot work. *Nursing Research* 1989; 38: 60-62.
26. Lindquist, R. Don't forget the pilot work! *Heart Lung* 1991; 20: 91-92
27. Teijlingen van, E., Rennie, A.M., Hundley, V., Graham, W. The importance of conducting and reporting pilot studies: the example of the Scottish Births Survey, *Journal of Advanced Nursing* 2000; 34: 289-295.
28. Teijlingen van, E., and Hundley, V. The importance of pilot studies. *Social Research Update*. 2001; 35:1-7
29. De Vaus, D.A. *Surveys in Social Research* (3rd edn.), London: UCL Press. 1993
30. Mason, D.J. and Zuercher, S.L. Pilot studies in clinical nursing research. *Journal of the New York State Nursing Association* 1995; 26:11.